

APPENDIX A. POSITIONING OF THOR IN A JEEP GRAND CHEROKEE

The following procedure is an example of how the posture of the Thor dummy can be adjusted within a vehicle to correspond to a target posture. In this example the Thor dummy was placed within a 1995 Jeep Grand Cherokee. The target posture was defined using volunteers seated in the same vehicle in their normal driving posture. The posture of the Thor dummy was set by adjusting the H-point, pelvis, spine, head, and neck according to Section 2.7- Dummy Posture Adjustments and Positioning.

To obtain the target posture, vehicle measurements were recorded using three volunteers with height and weight resembling those of a 50th percentile male. **Figure 1** illustrates the location of these measurements and the values can be seen in **Table 1**, which also include measurements for the Thor dummy. The objective was to use the range of the volunteers as a guide in positioning the dummy.

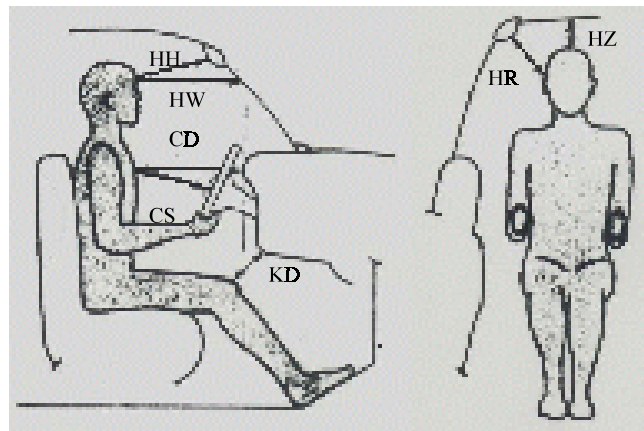


Figure 1 - In vehicle measurements

Table 1: Volunteer measurements					
	Volunteer				
	1	2	3	Range	THOR-Alpha
Height	71	72	70	70 - 72	70
Weight (lb)	175	178	155	155 - 178	~170
HH	21.25	17.75	19	17.75 - 21.25	18.63
HW	29.38	23.25	27.75	23.25 - 29.38	27
CD	29.50	25.50	26.50	25.50 - 29.50	25.75
CS	17.75	15	15	15 - 17.75	15

Table 1: Volunteer measurements					
KDL	3.75	2	4	2 - 3.75	4
KDR	3.25	2.13	3.75	2.13 - 3.75	3.38
HR	9.25	6.75	9.25	6.75 - 9.25	5.88
HZ	7	6.25	6.25	6.25 - 7	6
SP	39.50	37	37.88	37 - 39.50	38.13
KW	16.63	14.50	15.50	14.50 - 16.63	13.50
HDR	3	4	3.25	3 - 4	3.38
FA (degrees)	11	9	11	9 - 11	9

(All dimensions are in inches unless otherwise noted)

Where:

HH - forehead to windshield header

HW - horizontal distance from forehead to windshield

CD - distance from chest (nipple) to dash

CS - distance from chest (nipple) to center of steering wheel

KDL / KDR - knee to dash, left and right

HR - side of head above left ear to roof rail

HZ - top of head to head board

KW - knee width, from center to center

SP - point on seat to the toe pan

HDR - rear most point on the back of head to the head rest

FA - the included femur angle, or splay angle

Begin by placing the dummy into a seating posture recommended by GESAC as described in Section 2.7. Place the dummy into the vehicle and start by locating the H-point by using the H-point tool as shown in **Figure 2** and following the instructions in Section 2.6, H-point Tool Assembly and Use.

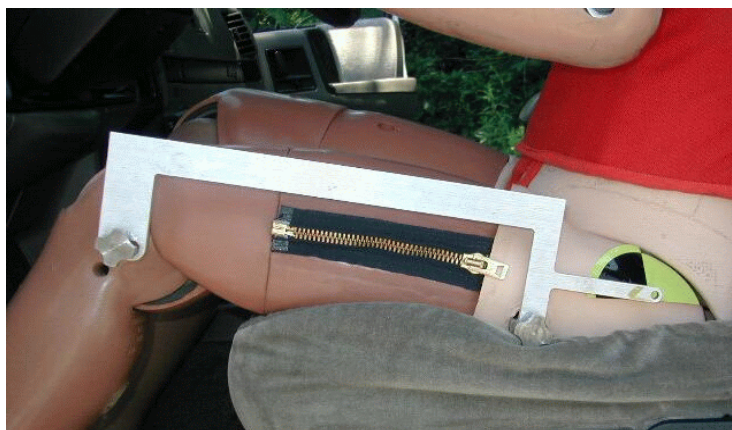


Figure 2 - Using the H-point tool.

Once the H-point has been found and marked on the left and right sides, move the dummy so that the its H-point matches the SRP (Seat Reference Point) for the test vehicle. Each vehicle's SRP is defined by the manufacturer. Check to see if the base of the head is parallel to the ground level.



Figure 3 - Lumbar adjustment

If the base of the head (Head / Neck Mounting Platform, part number T1NKM210) is not parallel to ground level (eyes are not facing straight forward), then the lumbar pitch change mechanism should be adjusted. (**Note:** The dummy is shipped with the lumbar pitch change mechanism preset to the slouch position (most commonly used position).) The position of the lumbar pitch change mechanism can easily be adjusted to reposition the base of the head by unzipping the right-side of the jacket, raising the right-side arm, and following the instructions described in Section 2.7. **Figure 3** demonstrates the in-vehicle adjustment of the lumbar pitch change mechanism. For this particular setup, the lumbar pitch change mechanism was rotated

forward to the super slouched position in order to bring the base of the head closer to being parallel with ground level.

NOTE: Due to interference between the upper and lower abdomen, the lumbar pitch change mechanism will not rotate past the super slouched position.

Next, the neck pitch change mechanism was adjusted according to Section 2.7 of this manual. To make the adjustments, unzip the right-side of the jacket, reposition the arm to have access to ribs 2 and 3, as shown in **Figure 4**, and correct the position of the neck.

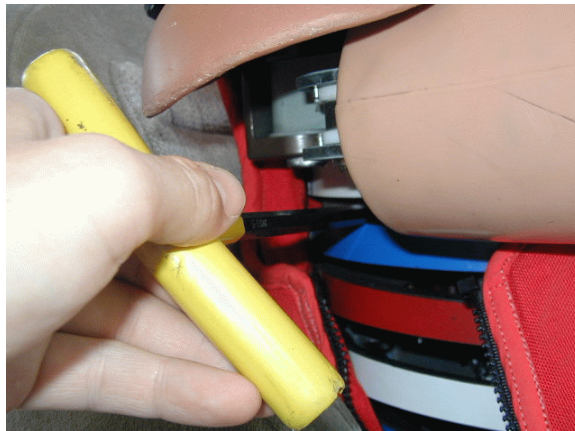


Figure 4 - Adjustment of neck pitch change

Usually the top and bottom plates of the neck pitch change mechanism are parallel, but in this case, the neck was rotated an additional 11 degrees forward. Rotating the neck allowed the dummy's eyes to look straight ahead and have the proper distance from the rear of the head to the head rest as listed in **Table 1**. **Figure 5** shows a comparison of the head position with a human volunteer. In this figure, Thor's head is approximately 3.38 inches away from the head rest while the volunteer's distance is approximately 3 inches.



Figure 5 - Head position compare to a volunteer

With the base of the head level (eyes looking straight ahead), it was not necessary to adjust the head angle. If the head needed adjustments, refer to Section 2.7 of this manual for detailed instructions. However, **Figure 6** demonstrates the ease of performing the adjustment while the dummy is in the vehicle.

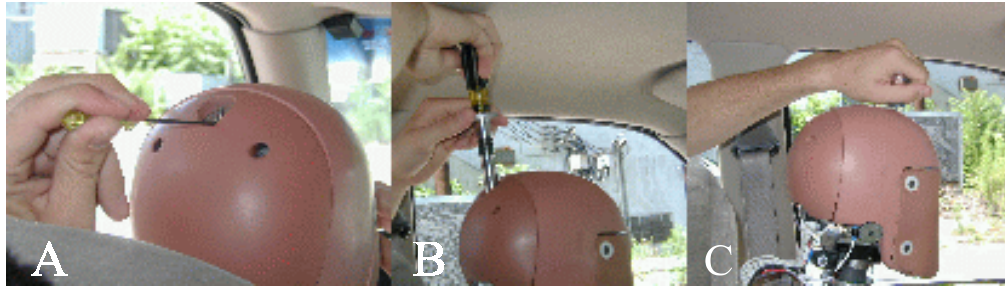


Figure 6 - A and B: Rear head plug removal and adjustment; C: Front head plug removal angle adjustment

In **Figure 6A** and **B**, the rear head plug is being removed. Use a 5/64 hex head wrench to remove the #2-56 x 1/2" screws that secure the rear head plug into the cap. Remove the rear head plug and insert the socket and slotted screw driver into the head cap to adjust. The front head plug is removed by using a large blade slotted screw driver as shown in **Figure 6C**. Adjustment of the front plug is also made using the same techniques as described for the rear plug. (**Note:** The head cap of the dummy does not need to be removed to adjust the head angle. This allows less chance of the dummy from becoming moved out of position.)

Figure 7 compares the final dummy position to a human volunteer. The measurements



Figure 7 - Posture comparison of dummy and volunteer.

of the dummy in the vehicle, as shown in **Table 1**, fell within the range of the volunteers. It can be seen in **Figure 7** that the THOR neck angle, chest, and head position showed good agreement with the volunteer, although, the position of the dummy's arms were slightly different from the volunteer. The dummy's hands were positioned approximately along the horizontal center line

of the steering wheel (dummy's arms and legs were positioned according to the positioning procedures as described in the National Highway Traffic Safety Administration's Code of Federal Regulation Part 571.2.) where as the volunteer chose a driving position more comfortable for him (hands positioned approximately at the 10 and 2 o'clock position).